

BEFORE THE

ORIGINAL

Federal Communications Commission

WASHINGTON, D.C. 20554

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APR 14 1995

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of

Preparation for International
Telecommunication Union World
Radiocommunication Conferences

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IC Docket No. 94-31

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To: The Commission

REPLY COMMENTS OF TRW INC.

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April 14, 1995

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TABLE OF CONTENTS

	<u>Page</u>
Summary	iii
I. Feeder Link Spectrum Requirements For "Big Leo" MSS Systems	2
A. The Commission Should Continue To Pursue A Range of MSS Feeder Link Options In The C-, Ku- and Ka- Bands	3
B. Radio Regulation 2613 Must Not Be Applied In Bands Designated For MSS Feeder Links	7
C. The WRC-95 Agenda Must Not Be Saddled With Extraneous Issues Relating To Nongeostationary Satellite Networks	8
II. Implementation Of MSS In Existing Bands Allocated For This Service	10
A. The Commission Should Take Additional Steps To Remove Existing Technical Constraints In MSS Service Link Bands	10
B. The Commission Should Work To Establish Streamlined Coordination Procedures For MSS Systems, But Should Not Advocate Approaches That Unreasonably Favor The Characteristics Of A Particular System	12
III. Date Of Entry Into Force Of MSS Spectrum Allocations Around 2 GHz	14
IV. Conclusion	15

Summary

TRW Inc. supports the bulk of the Commission's proposals developed from the initial round of comments and set forth in the Second NOI. TRW suggests herein, as well as in its prior comments, a few minor modifications that will enhance the efficacy of the U.S. positions for WRC-95.

Most significantly, achieving the goal of securing MSS feeder link spectrum must be the number one priority of the U.S. delegation at WRC-95. In view of the differing technologies to be employed by proposed MSS systems, the Commission has appropriately decided to pursue designated MSS feeder link spectrum in the C-, Ku- and Ka- bands. Barring use of any of these bands by non-geostationary systems would frustrate the establishment of versatile, feature-rich services not now available using geostationary space stations. For this reason, there is no reason to maintain the Ka-band solely for geostationary FSS use. Similarly, while RR 2613 continues to be reasonable for application in already congested bands, there is no justification for according geostationary satellites unwarranted permanent priority under 2613 in much less developed bands. The contrary view is out of sync with the overwhelming consensus established within the United States and in international working groups over the past several years.

It is also critical that discussion of MSS feeder link bands be strictly limited at WRC-95 to the terms of the agenda. Teledesic's effort to insinuate its own goals into the work plan for WRC-95 must be rejected. There is simply no basis for the vast expansion of WRC-95 to include consideration of nongeostationary satellite networks -- even if it were plausible to assume that the conference could handle such an increase in its appointed tasks.

Moreover, particularly in light of the recent CPM, it is especially important that the United States continue to advocate strongly the necessity of modifications to the ITU footnotes governing inter-service sharing in the L-band, particularly the deletion of the final sentence of RR 731E. One of the vital objects of U.S. participation in WRC-95 must be the formal recognition that the MSS and the radionavigation service have equal in this band.

Revisions also should be made to current Resolution 46 procedures to adapt them for use in coordinating nongeostationary MSS feeder links. The ultimate objective must be to provide a mechanism of achieving necessary coordinations that is not only streamlined, but is also fair and even-handed. Accordingly, the "Annex 7" methodology advanced at the CPM should not be incorporated into the Resolution 46 process. Current "frequency overlap" techniques are far more suitable for determining the need for coordination, and should not be abandoned in favor of a method that is deeply-flawed and appears designed to skew the analysis for the benefit of a particular system.

Finally, events at the recent CPM also demonstrated that any attempt by the United States to alter the current provisions of RR 746B, and thereby advance the date for use of the 2 GHz bands globally, would be "dead on arrival." For this reason, as TRW suggested in its initial Comments, it may be prudent for the U.S. to offer direct support to the developing countries on this issue, in order to gain their support for other, more important initiatives.

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REPLY COMMENTS OF TRW INC.

TRW Inc. ("TRW"), by its attorneys and pursuant to Sections 1.415 and 1.430 of the Commission's Rules, hereby replies to comments submitted in response to the Commission's Second Notice of Inquiry in the above-captioned docket. See Preparation for International Telecommunication Union World Radiocommunication Conferences, FCC 95-36 (released January 31, 1995) ("Second NOI").^{1/}

In the Second NOI, the Commission identified three central purposes that the United States delegation must pursue at WRC-95 with respect to the Mobile Satellite Service ("MSS") between 1 and 3 GHz:^{2/} (1) elimination of the existing

^{1/} Reply Comments in this proceeding were originally due on March 21, 1995. In order to permit parties to participate in the recently concluded WRC-95 Conference Preparatory Meeting ("CPM"), and provide them the opportunity to comment upon the activities at the CPM in their replies, the deadline for filing was extended to today, April 14, 1995, by order of the Chief of the International Bureau. See Order, DA 95-421 (released March 6, 1995).

^{2/} See Second NOI, FCC 95-36, slip op. at ¶ 8.

impediments to MSS use of bands already allocated for this service; (2) securing adequate, useable feeder link spectrum that will support MSS user links for the service bands already identified; and (3) obtaining additional viable MSS service and feeder link spectrum in order to accommodate the burgeoning worldwide demand for this service. In the initial comments, the participating parties evidence a significant level of agreement concerning the achievement of each of these goals. However, particularly with respect to items two and three, there are significant dissenting views concerning the means of achieving the desired outcome. TRW focusses these reply comments on those areas where substantial conflict remains.^{3/}

**I. Feeder Link Spectrum Requirements For
"Big Leo" MSS Systems**

The service link allocations at 1610-1626.5 MHz and 2483.5-2500 MHz that were secured through painstaking negotiation at WARC-92, and which have now been allocated to non-geostationary MSS ("NGSO MSS") in the United States, cannot be implemented by TRW and the other conditional licensees until adequate, useable feeder link spectrum is designated and assigned. If suitable spectrum is not secured at WRC-95, the opportunity will likely have passed, and the accomplishments won at

^{3/} TRW does not recapitulate here its views concerning potential additional MSS allocations, the Report of the Voluntary Group of Experts, or preparations for future WRCs. Although there continue to be some disagreements in these areas, particularly with respect to additional allocations, these issues have been fully aired in prior comments.

WARC-92 will have been for naught. For this reason, achieving the goal of obtaining such spectrum must be the number one priority of the U.S. delegation at WRC-95.

A. The Commission Should Continue To Pursue A Range of MSS Feeder Link Options In The C-, Ku- and Ka- Bands.

In order to ensure that there is adequate spectrum for the diverse MSS systems conditionally licensed by the FCC, as well as those U.S. applications that remain pending and systems which may be established by international organizations or licensed by other countries, the United States should seek sufficient MSS feeder link spectrum to accommodate proposed uses both above and below 17.7 GHz. In view of the different technologies to be employed by these systems, and the very substantial resources that have been devoted to these proposals, there would be no justification for arbitrarily excluding some frequency bands from consideration for MSS feeder links. The Commission has appropriately rejected such exclusionary suggestions in proposing to pursue designated MSS feeder link spectrum in the C-, Ku- and Ka- bands, and there is broad support among the commenters for this approach.^{4/}

Nonetheless, there are some continuing disagreements among commenters concerning the identification of particular bands for feeder link use. The most serious area of contention involves the apparent desire of some fixed satellite

^{4/} See, e.g., Comments of COMSAT Mobile Services ("COMSAT") at 11-12; Comments of Loral Qualcomm Partnership, L.P. ("LQP") at 12.

service ("FSS") interests to maintain the Ka-band in pristine condition for their future use, effectively barring use of these bands by non-geostationary systems that have been proposed and pursued for nearly five years.^{5/} The position of the FSS parties is wholly unrealistic.^{6/} While it is true that there is very high demand for geostationary satellite slots using the C- and Ku- bands, and that administrations have already advanced published space stations seeking to utilize the Ka-bands, there is also very substantial demand for spectrum to satisfy the needs of emerging non-geostationary systems, which will provide versatile, feature-rich services not now available using traditional geostationary space stations.^{7/}

While NGSO FSS interests continue to advocate an assumption that sharing among NGSO MSS feeder links and geostationary FSS ("GSO FSS") space

^{5/} See Comments of GE American Communications, Inc. ("GE Americom") at 5 ("MSS feeder links should not be located in the Ka-band at all"); Comments of Hughes Space and Communications Co., et al. ("Hughes") at 5.

^{6/} Indeed, given the extent to which geostationary satellites currently use the C- and Ku-bands, if one type of system were to be barred entirely from the Ka- band, it would be more reasonable to reserve this spectrum for non-geostationary satellite use, and require geostationary satellite operators to optimize their use of spectrum below 17 GHz in order to increase capacity.

^{7/} Accordingly, the Commission should not, as Hughes suggests, remove the 19.7-20.2 GHz and 29.5-30.0 GHz bands from consideration for MSS feeder links. See Hughes Comments at 15. These bands have been appropriately included in the Commission's Table 2 of possible feeder link bands, and should be added to the Commission's final official proposal for MSS feeder link spectrum. TRW has proposed use of these bands for its gateway links long before any of the geostationary FSS proposals for these bands.

stations will ultimately be proven feasible,^{8/} in TRW's view it appears very unlikely that sharing among multiple NGSO MSS and GSO FSS systems will be possible.

Indeed, even if co-directional sharing between a single NGSO MSS feeder link system and a single GSO FSS system is feasible, it is expected that the techniques that would be employed to enable such "one-on-one" sharing would not continue to be effective in a multi-system sharing environment.^{9/}

With these sharing difficulties in mind, TRW recognizes that it may not receive access to its first choice of bands. TRW is prepared, however, to accept other spectrum that may be made available, provided that it is assured access to sufficient bandwidth to provide service using the Odyssey™ system as currently designed. In order to meet these needs, as well as those of Motorola's Iridium system, it is essential that at least 500 MHz of spectrum in each direction be designated for primary use by NGSO MSS feeder links, as indicated in the Second NOI.^{10/}

In an effort to provide the necessary certainty for long-term operation that the NGSO MSS systems require, while minimizing the impact that the provision of such certainty would cause in the 2.5 GHz of spectrum in each direction that is the Ka-band FSS allocation, TRW has worked in conjunction with Motorola and others to

^{8/} See Hughes Comments at 6-10.

^{9/} Compounding matters is the fact that none of the studies done to date has taken into account the terrestrial Fixed Service, which will further diminish sharing possibilities.

^{10/} See Second NOI, FCC 95-36, slip op. at ¶ 53, Table 1, and Table 2 (Note 12).

devise a compromise proposal for use of the 19.2-19.7 GHz and 29.0-29.5 GHz bands, which are already identified as the preferred Ka-band feeder link alternative in the recently-completed Report of the CPM to WRC-95. Although TRW would be required to shift its feeder link spectrum to different bands, it is willing to consider shouldering the burdens of necessary redesign efforts -- if it will lead to dedicated spectrum for NGSO MSS feeder links with appropriate protections.

This compromise would be ideal for all concerned. If the proposed designation of 500 MHz of spectrum in each direction is made for MSS feeder links, and the GSO FSS interests are ultimately proven correct in their assessment that co-directional sharing is possible, those proposing geostationary space stations should be able to demonstrate that no harmful interference would result from satellite deployment, and thereby secure use of the bands. The burdens and risks associated with this proposal are therefore negligible for the GSO FSS community. On the other hand, if the GSO FSS interests are proven incorrect in their assessment that co-directional sharing is possible, the burden on NGSO MSS systems would be profound -- requiring them to participate in never-ending coordinations and jeopardizing their ability to establish commercially viable systems.

Another potential alternative for establishing viable NGSO MSS feeder links would be a combination of Ku- and Ka-band spectrum, using one or both bands on a reverse band working ("RBW") basis. Some commenters, however, have suggested that the 15.4-15.7 GHz band should be earmarked only for Earth-to-space

use.^{11/} In fact, the Preliminary FCC Draft Proposal (1/FL-MSS) appropriately identifies this band as a candidate for space-to-Earth feeder links (while Table 2 in the Second NOI identifies it for use in the opposite direction). As TRW noted in its Comments,^{12/} this band could be paired with frequencies in the FSS bands at 18.4-18.6 GHz and 18.8-19.7 GHz band using RBW techniques. Under this scenario, the 18/19 GHz bands would be used for NGSO satellite feeder links in the Earth-to-space direction and by geostationary stations for space-to-Earth transmissions.

B. Radio Regulation 2613 Must Not Be Applied In Bands Designated For MSS Feeder Links.

Whatever bands are ultimately chosen for use by MSS feeder links, however, there is no justification for giving geostationary satellites permanent priority under RR 2613 in every FSS band. Because it is a key U.S. goal to establish spectrum for MSS feeder links, it is essential that these links be fully useable now and in the future, without fear of encroachment from geostationary satellites that may be launched some time in the indefinite future. While it is certainly appropriate for RR 2613 to continue to apply, as a general rule, in those bands below 17.7 MHz now heavily congested with GSO FSS systems, it is inappropriate to provide GSO FSS systems with any preference or unnecessary advantage vis-à-vis NGSO MSS in bands

^{11/} See LQP Comments at 14; Comments of Mobile Communications Holdings, Inc. ("MCHI") at 9.

^{12/} See TRW Comments at 15-18.

yet to be developed (i.e., the Ka-band). In any event, RR 2613 must be explicitly waived by footnote in each of those bands designated primarily for MSS feeder link use.^{13/}

Although a few self-interested voices are raised against this sensible approach,^{14/} they are out of sync with the overwhelming consensus established within the United States and in international study groups over the past several years, a process which is reflected both in the preliminary report of Informal Working Group 4 of the Industry Advisory Committee ("IAC") and in the Second NOI. Indeed, this process has already narrowed the focus for MSS feeder links to bands that are not heavily used by GSO FSS satellites.

C. The WRC-95 Agenda Must Not Be Saddled With Extraneous Issues Relating To Nongeostationary Satellite Networks.

Finally, it is critical that discussion of these bands be strictly limited at WRC-95 to the terms of the agenda -- the designation of spectrum for MSS feeder links. See WRC-95 Agenda, Item 2.1(c). In its Comments, Teledesic Corporation ("Teledesic") has creatively attempted to insinuate its own agenda into the work plan for WRC-95 by characterizing its proposed non-geostationary FSS use as, in effect,

^{13/} This approach has the advantage of requiring no change to RR 2613 -- a step that would be fraught with difficulties. TRW strongly urges that no "clarifying" changes to RR 2613 be proposed. Of course, even where RR 2613 is waived, coordination between geostationary and nongeostationary satellite systems would continue to be required.

^{14/} See Hughes Comments at 10 et seq.; GE Americom Comments at 2.

the functional equivalent of MSS feeder links.^{15/} Teledesic reasons that because it is necessary to consider the non-geostationary character of the fixed feeder link use of Ka-band spectrum, this should open the door to consideration of the much broader issues implicated by its proposed future use of Ka-band spectrum for *service* links of its mammoth non-geostationary FSS system.

Most significantly, Teledesic's proposed use of this band extends far beyond the proposed use of these bands for MSS feeder links. TRW's Odyssey™ system will employ links in the Ka-band for transmissions between a small number of terrestrial gateways, and a constellation of twelve satellites. In contrast, Teledesic's proposal involves transmissions from an indeterminate (but vast) number of fixed transmit/receive stations and an ambitious network of more than 800 non-geostationary satellites. The band sharing and interference concerns posed by the Teledesic system are accordingly dramatically greater than those for MSS feeder links.

There is simply no basis for such a vast expansion of the WRC-95 agenda, even if it were plausible to assume that the conference could handle such an increase in its appointed tasks. While three MSS systems are already conditionally licensed, and have spent years formulating feeder link proposals and conducting sharing analyses, Teledesic's application has yet to be put on Public Notice by the

^{15/} See Teledesic Comments at 10 et seq. and n.6.

FCC, and insufficient study of the system's needs has been undertaken.^{16/}

Attempting to impose these additional issues on WRC-95 at this time would be foolish, and ultimately unproductive.^{17/}

II. Implementation Of MSS In Existing Bands Allocated For This Service

A. The Commission Should Take Additional Steps To Remove Existing Technical Constraints In MSS Service Link Bands.

Among the initial commenters, there is broad support for the changes already proposed by the Commission affecting the MSS service link allocations at 1610-1626.5 MHz, as well as for additional modifications that will enhance the usability of these bands for MSS. It is of critical importance in continuing to prepare for WRC-95, following the CPM, that the United States strongly advocate the necessity of these changes, particularly the deletion of the final sentence of RR 731E.^{18/} One of the vital objects of U.S. participation in WRC-95 must be the formal recognition that the MSS and the radionavigation service are co-equal in the

^{16/} This fact is implicit in Teledesic's own repeated requests for additional study of sharing issues by the FCC and others. See, e.g., Teledesic Comments at 17 ("Sharing studies between non-GSO satellite systems and GSO networks also must be conducted before the FCC can determine the specific spectrum requirements for non-GSO satellite networks"). See also Comments of Motorola, Inc. ("Motorola") at 14.

^{17/} TRW agrees with Motorola that these issues may be appropriate for consideration at WRC-97. See Motorola Comments at 13; Comments of Iridium, Inc. ("Iridium") at 25-26.

^{18/} See LQP Comments at 3-7.

L-band, i.e., that the latter service has no special rights to extra protection that would relegate the MSS to de facto secondary status. There is no apparent domestic opposition to this sound approach.

There is also much support for the suppression of RR 733E.^{19/} This footnote was originally adopted when the radioastronomy service ("RAS") had only secondary status in the L-band.^{20/} Following the elevation of both RAS and MSS to co-primary status world-wide in these bands, the footnote has become redundant and should be deleted. Sufficient protection is accorded to RAS operations in the band 1610.6-1613.8 MHz by its co-primary status and by the separate protections of RR 734.^{21/}

^{19/} See LQP Comments at 9-10; Iridium Comments at 9; Comments of Constellation Communications, Inc. ("Constellation") at 3-4.

^{20/} See Second NOI, FCC 95-36, slip op. at ¶ 25. The intent at that time was to protect RAS stations operating at 1610.6-1613.8 MHz in Regions 1 and 3 from any harmful interference that might be caused by operations in the radio-determination satellite service, which was and is primary in these bands.

^{21/} TRW agrees with Motorola and Constellation that it would not be useful to substitute a new footnote incorporating the RAS protection rules adopted in the Big LEO service rules proceeding (47 C.F.R. § 25.213(a) (1994)). See Motorola Comments at 3; Constellation Comments at 4.

B. The Commission Should Work To Establish Streamlined Coordination Procedures For MSS Systems, But Should Not Advocate Approaches That Unreasonably Favor The Characteristics Of A Particular System.

As virtually all parties addressing the issue agree, revisions must be made to current Resolution 46 procedures to adapt them for use in coordinating NGSO MSS feeder links, including procedures to facilitate coordination in particular bands both below and above 17.7 GHz. The ultimate objective must be to provide a mechanism of achieving necessary coordinations that is not only streamlined, but is also fair and even-handed.

Given these threshold requirements, TRW has very serious reservations concerning particular proposals advanced by Motorola for system coordination (and identified as "Annex 7" at the recent CPM).^{22/} The proposal that Motorola has advanced is premised, not surprisingly, upon the particular characteristics of its Iridium system. As a result of this narrow focus, Annex 7 does not contain parameter calculations that are readily translatable for use in evaluating systems with architecture that differs from Iridium's. For example, the proposal's definition of "active satellite sub-area" includes as a key element the nadir angle from the satellite. Because Odyssey™ is not a nadir pointing system, this variable is inapplicable, and no useful calculations can be obtained for Odyssey™.

^{22/} The proposal is now a draft recommendation of Study Group 8D.

Moreover, the definition for variable "D," the "maximum field of view limit," contained in Annex 7 produces absurd results for coordination of medium-Earth orbit ("MEO") systems, such as Odyssey™. Computation of D for a MEO system yields a value larger than 7500 km. When coupled with the calculation for the system's active service region, based upon the above-described erroneous nadir-pointing assumption, the diameter of this "affected" region computes to approximately 23000 kilometers, or about one half the surface of the Earth.^{23/} Thus, the Annex 7 methodology implies an unreasonably large area of impact for Odyssey™ operations, and is useless as a paradigm for nongeostationary coordination.

Based on the inadequacy of the Annex 7 procedures for general use in coordination, TRW agrees with LQP that this methodology should not be incorporated into the Resolution 46 process.^{24/} Current "frequency overlap" techniques are far more suitable for determining the need for coordination, and should not be abandoned in favor of a method that appears designed to skew the analysis for the benefit of a particular system.

^{23/} The definition of D contains another anomaly in that it extends the perimeter of service down to the 0° elevation point, despite the fact that there is virtually no possibility of interference extending to the 0° elevation angle due to antenna beam gain roll-off.

^{24/} See LQP Comments at 27.

III. Date Of Entry Into Force Of MSS Spectrum Allocations Around 2 GHz.

In initial comments, COMSAT strongly asserted that the United States should push for an earlier world-wide date of use for the MSS allocations at 2 GHz.^{25/} No other commenters endorsed COMSAT's position, while several, including TRW, pointed out that the potential for use of these bands before 2005 is very uncertain, at best, even domestically.^{26/} For this reason, TRW urged that the U.S. delegation not squander valuable negotiating capital by making early entry in the 2 GHz band a priority at WRC-95.^{27/}

Events at the CPM demonstrated that any attempt by the United States to alter the current provisions of RR 746B, and thereby advance the date for use of the 2 GHz bands globally, would be "dead on arrival." A substantial number of countries from the Arab sub-continent and Africa consistently rejected any attempt to alter the compromises agreed to at WARC-92. Less vocal but equally resolute disagreement exists in other regions, including the Americas. All of these opponents are legitimately concerned with the impact of any potential near-term satellite use of these

^{25/} See COMSAT Comments at 4 et seq.

^{26/} See TRW Comments at 22-23; Joint Comments of the Association for Maximum Service Television, Inc. and Other Major Television Broadcasting Entities at 5 et seq.; Motorola Comments at 9; Iridium Comments at 18.

^{27/} See TRW Comments at 24-25.

bands upon the extensive networks of terrestrial microwave links that they have established -- some only recently.

In short, the obstacles confronting COMSAT's proposal are simply insurmountable, and any effort to take on the opponents is doomed to fail. Indeed, the level of resistance from important segments of the ITU is sufficiently high that even raising the issue would be viewed with such instant hostility that it could easily undermine U.S. efforts in other areas. For this reason, as TRW suggested in its initial Comments, it may be prudent for the U.S. to offer direct support to the developing countries on this issue, in order to gain their support for other, more important initiatives. Accordingly, the Commission should reject any further consideration of COMSAT's impractical proposal.

IV. CONCLUSION

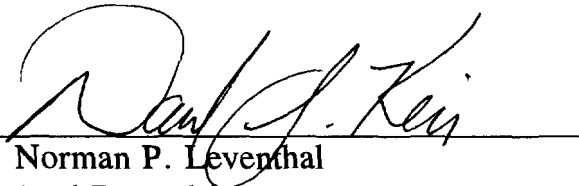
Based on the foregoing discussion, as well as its prior comments in this proceeding, TRW urges the Commission to adopt the majority of the positions proposed in its NOI with the modifications proposed by TRW. To this end, the Commission should maintain as its number one priority for WRC-95 the allocation of MSS feeder link spectrum sufficient to satisfy the needs of the MSS systems that have already been conditionally licensed. The Commission should also strive to eliminate all current clouds on the primary status of MSS within already allocated service bands,

and to obtain suitable additional allocations for MSS service links to accommodate the burgeoning worldwide demand for this service.

Respectfully submitted,

TRW INC.

By:

A handwritten signature in cursive script, appearing to read "David S. Keir", written over a horizontal line.

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